value which are at present at its disposal. The committee feels that the lay public, through their medical advisers and through the public press, should also be made aware of the danger to their efficiency and happiness which the inroads of the disease imminently threaten.

5. In the light of the foregoing considerations the committee purposes to broadcast, as widely as possible, both to the profession and to the public, its concept of the nature of the types of arthritis included under the heading chronic rheumatism, its belief as to the probable predisposing and exciting causes of the disease, and the knowledge which the committee possesses or may acquire as to the most efficient methods of treatment.

6. It is the belief of the committee that optimism, rather than pessimism, should dominate the attitude of the profession toward this problem. In most cases treatment should represent a combination of the various coördinated measures of therapy rather than one single procedure. Experience leads to the belief that under such circumstances an attitude of optimism toward the control of the disease is justified.

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REFERENCES

1. Pemberton, Ralph: Developments in the Problem of Arthritis, J. A. M. A., 96:33 (January 3), 1931.

2. Monroe and Hall: The Feces of Patients with Chronic Arthritis, Arch. Int. Med., 47:764 (April), 1931.

3. Paper read by Doctor Dickson at Baltimore before the American College of Physicians (March), 1931.

4. Rowntree: Polyarthritis—Further Studies on the Effects of Sympathetic Ganglionectomy and Ramisectomy, J. A. M. A., 93:179 (July 20), 1929.

5. Cecil, Nichols, and Stainsbury: Bacteriology of the Blood and Joints in Chronic Infectious Arthritis, Arch. Int. Med., 43:571 (May), 1929.

THERAPEUTIC IRRADIATION OF THE OVARIES*

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DISCUSSION *by William H. Sargent, M. D., Oakland; Edward N. Ewer, M. D., Oakland.*

THIS paper takes up the therapeutic action of roentgen rays and of radium when directed against the ovaries of women suffering from benign gynecological affections, as well as from diseases, remote from the sexual organs *per se,* but which are influenced by the ovaries. The opinions here presented are based on personal experience with some sixty patients.

GENERAL CONSIDERATIONS

The ovary, it may be said without fear of contradiction, occupies a dominant position in the female organism, even if we exclude entirely its function as the organ of reproduction. Its endocrine products, working harmoniously with those of other endocrine glands, are primarily responsible for the development of all the sexual characteristics of women. Upon the ovarian function depends the menstrual cycle, and the growth, and secretory, and other activities of the genital tract proper. The hormones of the ovary also influence such organs as the breasts, the thyroid gland and the pituitary gland, both in health and disease. It is also a fact that the functioning ovaries arrogate to themselves a great proportion of the general bodily energies. This is as it should be in health, but in disease it may prove a serious drain on the disease combating powers of the organism.[3, 4, 23]

Since the ovarian activity has such a profound effect upon the healthy genital tract and body generally, it is readily understood that this function may become quite deleterious, if the genital tract be diseased or ovarian function itself perverted. It is quite probable that such a perverted activity is the cause of menorrhagia, the so-called "benign uterine bleeding." Similarly, according to some, a perverted hormone of the ovary may stimulate to growth fibromyoma of the uterus.

If it is possible to eliminate either temporarily or permanently the ovarian function or to modify it, one may infer that a favorable therapeutic action will have been performed in many gynecologic and general affections. Such a therapeutic action may be accomplished by irradiation of the ovaries by means of roentgen and radium radiation.

The writer believes the action of roentgen ray and radium upon the ovary to be essentially similar. The effect that either of these agents may have upon the normal or pathologic tissues of the genital tract apart from the ovaries will be discussed later.

The epithelial constituents of the ovary are exceeded in sensitivity to radiation only by the lymphatic tissues and their pathological derivatives. In order to explain certain phenomena it may be also assumed that these epithelial constituents of the ovary vary among themselves in sensitivity. Thus the ripe follicles and the ripening ones are destroyed by a certain amount of radiation, whereas the primordial follicles are more resistant to the same amount of radiation and these latter may ultimately, after regaining their vitality, reëstablish the function of the ovary.[3] This observation is utilized therapeutically where it is *not* desirable to permanently eliminate ovarian activity. Seitz and Wintz state that 28 per cent of their skin unit dose, absorbed by the ovary, is necessary to obtain such a temporary "menostasis," or "menolipsis" as they call it.[5] Kadisch has published a table from which the necessary dose has been figured out by Neeff for various ages in "R" (German) units.[4] Recently the writer acquired a "mecapion," an integrating recording dosimeter, made in Austria, which promises much for the future.*

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* Read before the Radiological Section of the California Medical Association at the fifty-ninth annual session at Del Monte, April 28 to May 1, 1930.

* The construction of the mecapion makes it impossible to insert the ionization chamber into the body cavities, such as the vagina. Since writing the above the writer has convinced himself that phantom measurements are not sufficiently accurate and a second dosimeter which can be inserted into the vagina should be used for such delicate work.

If radium is to be used for such a purpose a maximum of 800-milligram hours should not be exceeded, the radium being placed into the cavity of the uterus and filtered with two millimeters of brass and the usual rubber tubing.[1] Not infrequently the returning menses after such treatment will be normal.

To produce a permanent amenorrhea by destruction of all the epithelial constituents of the ovary about 35 to 40 per cent of a skin unit dose must necessarily be absorbed, of course, by the ovary.[4, 5] The writer has found by phantom measurements that 350 to 400 "R" (international) are necessary. The skin dose naturally will vary with the thickness of the patient, but using two large ports, one may as a rule remain well below an erythema dose. The half value layer in water of the x-radiation which the writer uses is 5.6 centimeters. In order to obtain a prompt result the amount of radiation regarded as necessary should be given as rapidly as is consistent with the patient's general well-being. It is desirable to give the treatment in the first half of the intermenstruum, since the menses may then stop promptly, whereas irradiation in the second half makes another period inevitable, because the hormones which elicit menstruation have then already passed into the blood.[3, 5]

Again, one may have given a correct dose at a favorable time and yet two, or even occasionally three, periods may take place before final and permanent cessation without further radiation. The writer has observed this phenomenon repeatedly, and it may be explained by the assumption that some of the ripening follicles are still able to mature and thereby elicit a menstrual cycle before they die.

The dose of radium given intra-uterinely to accomplish the same purpose must be from 1200 to 1800-milligram hours.[1]

Since, in younger women, especially when child-bearing is probable, it usually is not desirable to abolish the function of the ovaries permanently; it is necessary, if radiation therapy be used at all, to be aware of possible consequences should postradiation pregnancy occur. Let me say, before I proceed, that temporary elimination of ovarian function by radiation is practiced extensively in Europe, using the roentgen ray, whereas, as far as I have observed, the same thing is done in America with radium. All those who advocate intra-uterine dose of radium of less than 800-milligram hours are practicing this form of therapy and must take a stand in the question of injury of offspring by their therapeutic endeavors.

A review of the literature concerning this phase of the subject in hand brings me to the conclusion that the matter is still in suspense. The results of animal experiments, done usually on small mammals or on insects, vary from observation of permanent developmental abnormalities, which are inherited as recessive Mendelian characteristics for several generations, to apparent absence of any injury which is also observed for several generations.[15, 16, 24, 25] Animal experiments, it is clear, will not solve the question with finality. Accordingly the statistical study of the incidence of developmental abnormalities in the offspring of radiated women has begun and this must then be compared with the incidence of abnormalities in the offspring of normal individuals. Then, and only then, can this important question be answered. For the present caution in the matter of temporary sterilization of women who might afterward conceive must be observed.

If conception of a radiated ovum occurs before menostasis has taken place, the product of conception usually dies and is either spontaneously aborted or must be removed. However, if death does not take place and the pregnancy goes to term, stillbirth or developmental abnormalities are likely. Less great is the danger of injury to offspring if conception takes place when a radiated ovary has returned to its function after a shorter or longer lapse of time. Such ova are apt to have recovered their vitality completely and show no evidence of the radiation insult received in the children derived from them.

An entirely different and much more serious proposition is the, usually quite accidental, irradiation of the already fertilized ovum, the embryo or fetus. So serious is the damage caused by radiation apt to be that nearly all writers on the subject advise termination of pregnancy. If radiation takes place during the first three months, the embryo usually dies, but if later, then it may come to term and show more or less serious developmental defects.[13, 25]

Personally the writer has been fortunate enough to escape experiences in the matter of injury to offspring, but is holding the possibility constantly in mind and acts accordingly and so advises his patients.

Pregnancy is, therefore, an absolute contraindication to radiation treatment unless one is dealing with carcinoma of the cervix, and the discussion of this is not within the scope of this essay.

SPECIAL PHASES

So much for general considerations in the therapeutic irradiation of the ovary. The particular and clinical phases of the subject may now be taken up with greater brevity.

Disease Groups to Be Considered.—Types of gynecological and other diseases which may be expected to be benefited by temporary or permanent elimination of the ovarian function will now be enumerated and discussed. Such are:

1. Benign uterine bleeding characterized by menorrhagia without any or little demonstrable organic pathology of the uterus.

2. Painful menstruation and association of the periods with more or less severe general symptoms.

3. Fibromyoma uteri, selected cases, the criteria of such selection to be discussed below.

4. Chronic infectious diseases of the uterus and adnexa.

5. Diseases outside of the genital tract, but aggravated in their course by the continuation of the menstrual cycle.

1. *Benign Uterine Hemorrhage.*—Benign uterine hemorrhage is characterized by increased menstrual flow both as to quantity as well as duration and frequency of the period. As a rule uterine pathology is not demonstrable and the pathology of the mucosa, when present, is usually of minor character.[22] The cause of the hemorrhages is accordingly sought in the ovaries and is probably a disturbance in their hormonic control of the process of menstruation. Therapeutic irradiation of the ovaries with a view of eliminating temporarily or permanently their function, is the treatment of election in such cases. Since the majority of these patients are in the climacteric or preclimacteric age, complete elimination of the ovarian function may be done without hesitation. Roentgen radiation is the agent of my choice for reasons of safety and economy, but in patients where exsanguination has progressed to such a degree so as to make immediate cessation of the hemorrhage imperative, radium inserted into the cavity of the uterus is to be preferred since it accomplishes this end immediately, while roentgen radiation does not.[20, 22]

In younger women when radiation treatment is to be used at all, temporary menostasis is recommended and may be accomplished by careful dosimetry, and perhaps in the majority of cases Kadisch's tables can here be especially valuable.

The good results in patients with benign uterine hemorrhage, in my experience measure up to a 100 per cent standard, provided the proper agent has been selected and that dosage has been adequate.

As *contraindications* to radiation therapy may be considered:

Uncertainty of the diagnosis regarding the benign nature of the hemorrhage. This uncertainty may be cleared by a diagnostic curettement and such curettement is demanded in all cases by many gynecologists. In my opinion, for which I can quote weighty supporting opinions, it is certainly not necessary or desirable in the majority of such patients, provided an otherwise competent gynecological examination has been made and the diagnosis is reasonably certain. Of course, when radium is used a curettement may be done as a matter of routine.[2, 8, 11]

Youth of the patient. This contraindication depends chiefly upon the stand one takes in regard to the matter of radiation injury to possible offspring, since one would attempt to produce only a temporary menostasis and not eliminate the ovaries permanently. The writer has personally been conservative in this regard in the past and has excluded patients who were much below forty years of age from treatment.

Association of the uterine hemorrhage with other diseases of the genitalia which in themselves require surgical treatment is another important contraindication to the radiation method of elimination of the ovarian function.

Extremely neurotic or psychopathic individuals might form a further class in whom menostasis is contraindicated, since the cessation of the periods is apt to aggravate the neuropsychopathic symptoms. Epilepsy, under certain conditions, and migraine are exceptions.

Hypertension. The menopause in hypertension is apt to be followed by further increase in blood pressure and liability to apoplexy. I have two such patients in whom apoplectic strokes took place after cessation of the menses. Of course, such patients are poor risks no matter what is done.

Artificial menopausal symptoms in general, as far as I have been able to ascertain from my patients, are less, or at least not worse, than those of the natural menopause. It has been my experience that the women usually consider themselves, and are actually, in better health and spirits after treatment than before.

2. *Painful Menstruation.*—Painful menstruation and menstruation associated with systemic symptoms, such as migraine, referable particularly to the nervous system, are not uncommon and about 25 per cent of all my patients belong to this class. If the fortieth year has been reached, radiation menopause by means of the x-ray is a justifiable procedure. The results are usually extremely gratifying, and the writer knows of no more grateful patients than these women who have been freed permanently of their monthly tortures. Most of the contraindications to radiation treatment given under uterine hemorrhage should be considered also in treating these cases.

3. *Fibromyoma Uteri.*—It has long been a matter of observation that tumors of this type are stimulated to growth by the continued function of the ovary, and this no matter what their primary causes may be.[3, 4] Accordingly, if treatment be indicated here at all, it is logical to direct radiation therapy to the ovaries with a view of permanently abolishing the ovarian function. In making this statement the writer does not wish to deny the fact that both radium and roentgen rays also exert a direct action on the tumor tissue and probably on its vascular supply, with a tendency to produce shrinkage, but it seems to him desirable to look upon the ovarian hormones as a dominant factor, and to make the elimination of their activity a condition *sine qua non.* This view is by no means universally accepted, and the Italian school of gynecological radiation therapists, headed by Spinelli of Naples, seeks by all means to protect the ovaries while radiation treatment is directed to the fibromyoma purely.[6, 7, 10] The French school seeks to eliminate the ovarian function as well as to utilize the direct action of radiation of the myomata, while the German school, insisting that the elimination

of the ovarian activity is the only essential thing, tries to accomplish permanent menostasis in a single series of radiation, and subsequently leaves the tumor to shrink without further therapeutic interference.[9, 11, 12] In America, as a rule, the French idea is followed,[14] but our gynecologists, with a few notable exceptions, are so under the spell of surgery that they will not usually allow even most suitable cases to be treated by radiation. In Europe, on the other hand, it has been the gynecologists to whom the honor largely belongs of having developed radiation therapy in general.

The writer in the majority of his cases, such as small interstitial fibromata, has followed the idea of prompt elimination of ovarian function by a single treatment or through a limited series of treatments. More recently, in some quite large myomata, the principle that radiation has a direct action on the tumor has been applied in several series of radiation treatments that have been given after the radiation menopause had set in, and with gratifying results. In two cases tumors of the size of six to seven months' pregnancy shrank within eight months to the size of grapefruits. This was done with the roentgen ray. For such large tumors radium is not suitable, used intra-uterinely, but radium may be used with advantage in such as are not larger than three months' pregnancy, especially when prompt hemostasis is essential.

The criteria for selection of cases of fibromyoma uteri as suitable for radiation treatment may be best covered, perhaps, by enumerating the usual *contraindications* and commenting upon them.[1, 3, 4] Such are:

Youth of patient. In all cases where it is desirable to preserve the endocrine and reproductive function of the ovary, radiation treatment is as a rule contraindicated and surgery is to be preferred. Youth, of course, is a general contraindication to pelvic radiotherapy.

Myomata that cause acute or serious pressure symptoms and where speedy relief is necessary should be referred to the surgeon. Chronic and mild pressure symptoms, on the other hand, may be treated by radiation, especially since surgical intervention can always be done, should it become necessary.

Degeneration of myomata, clinically manifest, is always contraindication of radiation treatment.

Association of carcinoma of the body of the uterus or of the adnexa with fibromyoma of the uterus are best treated surgically. However, I cannot see why preoperative roentgen radiation or radium or both would not be of distinct benefit, in fact, indicated. Cervix carcinoma, of course, is best treated with radium rather than surgery.

Pedunculated myomata, whether they lie in submucous or subserous tissues, are always a contraindication to radiation, but the fact that a tumor lies in the submucous or subserous tissue, not necessarily so. Undoubtedly many such cases are treated undiagnosed and with success.

Myomata which are associated with infectious disease of the pelvic organs are contraindications to radiation therapy only if the infection is acute. Otherwise they may be treated, but with a cautious and specially modified technique.[3, 4, 18]

Large myomata, such as reach above the umbilicus, are usually mentioned as being unsuitable to radiation treatment. This holds true for the intra-uterine use of radium, but roentgen radiation may be used with good hopes of success.

Sarcomatous degeneration of myomata. Here again, in my opinion, vigorous preoperative radiation therapy is not only not contraindicated, but actually indicated, since these sarcomata are quite sensitive to radiation.[5]

The association of malignant tumors with fibroma of the womb may be here discussed since this is not infrequently brought up as an argument against radiation therapy.

Sarcomatous degeneration of myomata, according to revised statistics of various American and European clinics, are exceedingly rare complications; in fact, only 0.3 to 0.5 per cent of all uteri removed show such pathologic changes. Accordingly, Ewing terms the use of it as an argument against radiation, "mere sophistry"; and John Clark also has taken a strong stand against it.[1, 2] Likewise, carcinoma of the body of the uterus is a rare disease, and, if suspected, the question can usually be decided by a diagnostic curettage preceding radiation. Careful observation after radiation is an excellent way of determining whether the primary diagnosis has been correct. With a small private or semiprivate clientele, this is, of course, more reliable than that with the large material of a big clinic.

An interesting question is whether the development of malignant tumors is more common in a uterus which has been subjected to radiation than in one which has not. The conclusions of Kupferberg, Corscaden and Stout are, that this occurrence is far too rare to be used as a successful argument against radiation.

All uncomplicated fibromyomata of the uterus which for some reason or other need treatment—*the majority of fibroids, perhaps, do not*—are favorable for radiation therapy. Especially so when the patient is near the menopausal age, suffers from some general disease which makes her a poor surgical risk, when the diagnosis is clear and no elaborate gynecological technique is required for clarification.[17, 21]

The results, as far as eliminating the most serious symptom, hemorrhage, is concerned, as a rule are always successful. Complete involution of small fibromata may be expected in 85 to 90 per cent and in large tumors in about 50 per cent of the cases. All tumors involute more or less markedly. The process as a rule is slow, but the involution will continue for as long as eighteen months after treatment.

4. *Chronic Infections of the Uterus and Adnexa.*—Chronic infectious disease, especially gonorrheal infection of the female genital tract, may be favorably influenced by roentgen-ray therapy.

The intra-uterine use of radium, with its attendant manipulation, is dangerous since it might result in lighting up the infection to a serious degree.[1,2] The guiding principle in this treatment is the observation that the periodic congestion of the pelvic organs, incident to continued menstruation, adversely affects the infectious process. Therefore, if it be possible to temporarily or permanently eliminate the menses by therapeutic irradiation of the ovaries, a therapeutic action has been done. The writer would give small doses, say about 30 to 50 "R" units, absorbed by the ovary, and repeat this weekly or at longer intervals until the ovary has absorbed about 280 to 350 "R" units, keeping track of the loss of radiation in the tissues by means of Pfahler's saturation charts. To be sure, here also a favorable direct action of the radiation on the infected tissues enters in. Those who are in favor of such treatment are increasing, and Seitz makes the statement that "in these cases radiation therapy will frequently relieve us of the sad necessity of surgical extirpation of the entire genitalia in youthful individuals." [3, 18, 19]

Contraindications are acute infections and, of course, association with malignant neoplastic disease as set forth under previous headings. The general contraindications to radiation therapy apply here too, modified in some instances.

5. *Diseases Outside the Genital Tract.*—Lastly I wish to discuss a few pathological conditions remote from the sexual tract which may be benefited by therapeutic irradiation of the ovaries. Carcinoma of the breast in young women is unquestionably stimulated by the ovarian hormones. It is not an infrequent observation to see the breasts of normal women swollen and engorged and painful just prior to the menses. Accordingly it is reasonable in cases of carcinoma of the breasts, when such newgrowths occur in young women, to eliminate the ovarian function by means of radiation. At the Radiumhemmet at Stockholm this is, according to my information, a routine procedure. I have had occasion to do it in two patients and have been impressed by the decreased malignancy and increased radiosensitivity of the tumors (metastases and recurrences).

An equally close relationship exists between the ovaries and the thyroid gland, and in various types of toxic goiter such relationship is quite evident. In suitable cases it is possible to favorably influence the course of a Graves' disease by elimination of the ovarian function. One such case which combined a rather severe exophthalmic goiter with benign uterine bleeding may be cited here. After treating the thyroid with rather limited success for a period of time by means of x-ray, the ovaries were irradiated and an artificial menopause produced. The metabolic rate dropped sharply to normal and the clinical symptoms of Graves' disease subsided. In advanced cases of tuberculosis of the lungs associated with even slight menorrhagia, the course of the disease may often be turned toward a cure by eliminating this drain on the fighting resources of the body. The author has observed such a patient, now completely cured, for many years.

SUMMARY

1. Radiation therapy directed to the ovaries with a view of the temporary or permanent elimination of their function is safe and economical in many gynecological and general diseases.

2. Roentgen or radium radiation is the treatment of choice in benign menorrhagia, painful menstruation and menses associated with severe systemic symptoms. It may be also termed the treatment of choice in simple uncomplicated or intramural fibromyomata of the uterus not exceeding the size of a three months' pregnancy. Larger myomata may be treated with the roentgen ray with excellent hopes of success. It is especially indicated where such tumors are complicated by serious renal, cardiovascular, or pulmonary diseases.

3. Of the two agents used in radiation therapy the roentgen ray is the safest and most economical to the patient. Radium is most valuable when the immediate cessation of a uterine hemorrhage is imperative, or when a diagnostic curettage is to be done.

4. The one general and absolute contraindication to all radiation treatment in benign conditions is pregnancy. There are also special and relative contraindications to radiation treatment, especially in the treatment of fibromyoma uteri which I shall not repeat here.

5. In treating youthful patients the ovarian function need not be permanently abolished, and this end may be accomplished by careful and accurate dosimetry (dosimeter in vagina, preferably).

6. The question of damage to the offspring arising from the fertilization of a radiated ovum has not yet been settled for the human. Personally, I think as a rule women much below forty years should be excluded from radiation therapy whenever possible.

7. Radiation therapy does not exclude subsequent surgery nor render it, as a rule, more difficult.

8. Radium will stop uterine hemorrhage within twenty-four hours even in small doses, the latter by direct action on the endometrium. This is not equivalent to action on the ovary of larger doses.

9. The number of authors is increasing who report favorable results from roentgen irradiation of the ovaries when used in chronic infectious disease of the genital tract.

10. Cessation of the menstrual function through irradiation of the ovaries has a valuable therapeutic effect in carcinoma of the breast in Graves' disease and in tuberculosis of the lungs.

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REFERENCES

1. Clark, John G., and Norris, Charles C.: Radium in Gynecology, 1927.

2. Radium Report of the Memorial Hospital, New York, 1924.

3. Lehrbuch der Strahlentherapie. Ed. Hans Meyer, Vol. 4, parts 1 and 2. 1929.

4. Handbuch der Gesamten Strahlenheilkunde. Ed. Paul Lazarus, Vol. 2. 1929.

5. Seitz and Wintz: Unsere Methode der Roentgentiefentherapie. 1920.

6. Spinelli, Mameli: L'actinotherapia nei Miofibromi Uterini, 1925. Abstract in Internationale Radiotherapie (Wetterer), 1:435.

7. Nemours, A.: Traitment da Fibrome Utérin Après Inclusion des Ovaires Dans des Coques de Plomb. Resultats éliognés 9 Congr. de l'ass. Franç. pour L'avancement des Sciences. 1925.

8. Newcomet, W. S.: Control of Uterine Hemorrhage by Roentgen Ray, J. A. M. A., p. 1459, 1925.

9. Pankow, O.: Bestrahlung bei Myomen und Haemorrhagischen Metropathien, Strahlentherapie, 21:222, 1926.

10. Wetterer, J.: Internationale Radiotherapie, Gynäkologie, Vols. 1, 2, and 3.

11. Ammon, E.: Die Erfolge der Strahlenbehandlung bei Uterus Myomen und Haemorrhagischen Metropathien, Strahlentherapie, 34:557, 1929.

12. Wood, Francis C.: Roentgen Treatment of Uterine Fibromyomas, J. A. M. A., 99:601, No. 9, 1930.

13. Flaskamp, W.: Über Roentgenschaeden und Schaeden Durch Radioaktive Substanzen, p. 212, 1930.

14. Béclère, A.: Roentgentherapie des Fibromyomes de l'Uterus, Gynecologie, 25:80, No. 2, 1930.

15. Schmidt, W.: Neue Beobachtungen zue Frage der Nachkommenschädigung nach Ovarialbestrahlung, Strahlentherapie, 30:24, 1928.

16. Little, C. C., and Bagg, H. G.: The Occurrence of Two Heritable Types of Abnormality Among the Descendants of X-Rayed Mice, Am. J. Roentgenol., 10:975, 1923.

17. Richards: Radiation in the Treatment of Benign Diseases of the Female Pelvis, Canad. M. A. J., April 1925.

18. Gauss, J.: Differentialdiagnose and Therapie der Entzündlichen Adnexentumoren, Deutsche Med. Wchnschr., 1925.

19. Bott: Über die Behandlung von Unterleibsentzündungen mit kleinen Roentgenlichtdosen, Monatschr. f. Geburtsh. u. Gynäk., 17, 1925.

20. Keene, F. E.: Contraindication to Radium in the Treatment of Disease of the Female Pelvis, Am. J. Obst. and Gynec., 8:201 (Aug.), 1925.

21. Keith, D. Y., and Keith, J. B.: Irradiation in Benign Affections of the Uterus with a Report of Cases, Radiology, 4, No. 1, 1925.

22. Fluhman, C. F.: Uterine Bleeding, California and West. Med., 30:153, No. 3.

23. Novak, Emil: Recent Advances in the Physiology of Menstruation, J. A. M. A., 94:833, No. 12.

24. Mavor, James W.: Studies in the Biological Effects of X-Ray, Am. J. Roentgen., 10:968, 1923.

25. Nurnberger, L.: Ovarialbestrahlung und Nachkommenschaft, Strahlentherapie, 24:125, 1927.

DISCUSSION

William H. Sargent, M. D. (1624 Franklin Street, Oakland).—The effectiveness of irradiation treatment in suitable cases of uterine hemorrhage and fibroids has been proven beyond all doubt. In view of this fact every case in which radical treatment is necessary should be considered from the standpoint of radiation as well as surgery. In so-called idiopathic hemorrhage it is the treatment of choice in a very large percentage of cases.

While Doctor Siefert mentions age, say under forty, as being a contraindication, more or less, my personal experience does not bear this out entirely. In young women in whom all other therapeutic measures have failed and for whom a hysterectomy is necessary for relief, irradiation certainly should be considered, and radium preferably. Where it is deemed advisable, a single, small, carefully chosen dose of radium may be used with reasonable assurance of restoring normal menstruation in from two to four months without producing an amenorrhea.

In older women, say from ages thirty-five to forty, where a large dose is advisable (from 800 to 1200 milligram hours), a temporary amenorrhea usually results which lasts from a few months to a year or so. (It is rare that a dose within this range will produce a permanent menopause in women under forty, but occasionally it may.) When menstruation returns after this treatment, it will be within a fair degree of normal in many cases.

In any case where the return menstruation is abnormal, the question then arises as to whether to repeat the irradiation or use surgery. In very young patients it seems permissible to repeat the radium treatments once or twice if there are evidences of benefit from the previous treatment. These cases are rare and require the exercise of good judgment.

In the cases where an amenorrhea had been produced, repetition of the irradiation depends upon what the condition of the patient was during the temporary menopause. If the menopausal symptoms did not cause much discomfort and the patient otherwise had been in good health, she usually decides the question for herself by requesting irradiation. Where she has not felt well she usually decides to put up with the more or less abnormal menstruation or resort to surgery. This probably is the wisest course to pursue. Fortunately the great majority are in the former class. When irradiation is repeated, small doses of x-ray are used and not radium.

The very debatable question of abnormal offspring resulting from those previously irradiated cannot be discussed here, but it does seem, considering our present knowledge of the matter, that this is not a logical argument against irradiation when radical measures are necessary.

It must be again emphasized that the above applies to young women only who have failed to respond to all other treatment and have finally come to the necessity of radical measures. This, and this only, justified irradiation in these cases.

Much of the above applies also to uterine fibroids, bearing in mind the contraindications mentioned by Doctor Siefert. Larger doses are necessary, hence it is not likely that ovarian function can be conserved. It has been my experience that permanent reduction of the fibroids or control of the associated hemorrhage cannot be accomplished without the prohibiting of ovarian function. I have had no experience in the irradiation of the tumors at the exclusion of the ovaries.

It should be remembered that irradiation is not advisable in young patients if a fibroidectomy can be done.

In regard to the irradiation treatment of fibroids that persist or enlarge after the menopause, it has been my impression that this is not generally advisable. Fibroids usually undergo spontaneous decrease in size after the menopause. Those that do not should be looked upon with suspicion and considered a surgical problem. It is always advisable, if x-ray is considered, to make an x-ray examination of the pelvis previously, to determine if there are degenerative changes present, as evidenced by calcification.

As to the relative merits of radium and x-ray, both are equally efficacious, but under certain conditions one or the other may be more advantageously used. To mention but one example, in cases of hemorrhage over forty, or perhaps even less, a curettage in most instances seems advisable for purposes of diagnosis, regardless of statements to the contrary. I have had two cases of uterine bleeding in which there were not the slightest evidences of carcinoma, and yet a curet-

tage revealed a small adenocarcinoma. If then a curettage is advisable, radium should be used at the same time, and treatment not delayed for subsequent x-ray.

There are other points I would like to discuss if time permitted; suffice it to say that radiation is a most reliable therapeutic measure for uterine hemorrhage with or without fibroids. It produces results with the least possible danger to the patient, and in justice to those who require it, it is to be hoped that it will always be given most careful consideration.

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EDWARD N. EWER, M. D. (251 Moss Avenue, Oakland).—From the technical standpoint of the subject of radiology Doctor Siefert's opinions as expressed in this paper are entitled to great consideration. I believe, however, that most gynecologists will differ with him on several points in x-ray and radium therapy as applied to conditions met with and properly belonging within the sphere of their specialty. For instance, the essayist states that benign uterine hemorrhage in the preclimacteric age is usually without pathology in the uterine mucosa, and hence complete elimination of the ovarian function by roentgen radiation may be done without hesitation. This is settling the question of endometrial pathology by guesswork.

In every large gynecologic clinic where the importance of early cancer detection is stressed and where, if anywhere, "competent gynecologic examination" can be made, cases of beginning adenocarcinoma of the body of the uterus are not infrequently discovered by curettage, which the author condemns. At Highland Hospital three such unsuspected cases have been found upon microscopic examination of uterine scrapings during the past year. It is generally agreed that with our present knowledge of cancer, treatment to become more efficient must depend upon early diagnosis. And with the patients in question early diagnosis will depend upon more and more diagnostic curettage. This can be done and radium inserted in one seance.

We may agree with the essayist that painful menstruation after the age of forty, which does not depend upon pelvic pathology which in itself needs correction, may be relieved by radiation elimination of the ovarian function. But dysmenorrhea at that age is not frequent if we except the cases which are secondary to some adnexal trouble such as an inflammatory lesion, where the pain is really in the lesion and is brought on or made more severe by the local periodic congestion. Most gynecologists object to the radiation of such pelvic inflammatory lesions whether they are acute or chronic.

I recently opened, per vaginam, an infected adnexal cyst which flared up two weeks after an x-ray treatment for what had been diagnosed as uterine fibroma.

Perhaps the most pronounced controversial point in this paper is the statement that "radiation is the treatment of choice in simple uncomplicated interstitial and intramural fibromyomata of the uterus of *all sizes.*"

My experience indicates that such a fibroid is not common and that some of the numerous complications are often impossible of diagnosis. A few days ago I saw one the size of a grapefruit along with an unsuspected ovarian cyst of equal size. Two other recent cases were accompanied by subacute salpingitis. Experience with a few cases of complicating malignancy makes me chary of the adoption of radiation as the treatment of *choice.* Rather I would use it as a treatment of *necessity* in those cases of small or large fibroids which have bled so much that the patient is not fit for surgery. Small fibroids which are not growing and are not producing symptoms should be left alone but kept under observation. Large ones should be treated surgically, for if not producing pressure symptoms, they are likely to in the future and as they progress most of them undergo some one of the degenerative changes or cause myocardial trouble which reduces the success of any treatment.

To quote from W. J. Mayo: "The most common conditions indicating operation are those which result from: 1. Hemorrhage. 2. Degeneration (22 per cent). 3. Malignant disease, usually carcinoma of the body of the uterus (4 per cent); 10 per cent of women more than fifty years of age who come to operation for uterine myoma have complicating malignancy. 4. Tumors causing pressure. The great majority of patients who have tumors extending above the pubes belong to this group. It has been shown that in 30 per cent of patients with myomata of the uterus which cause symptoms the ovaries and tubes are seriously diseased and often require operation independent of the myomata."

It seems to me that the facts noted call for surgery more often than not as an agent of conservatism and precision and sufficiently refute the suggestion that American gynecologists are unduly under the "spell of surgery."

I have owned and used radium in gynecology for over ten years, and find its indications quite definite but within limits considerably more circumscribed than those proposed by Doctor Siefert.

The author states—and I think correctly—that all cases of carcinoma of the cervix should be treated with radium, and the dosage must be adequate. All cases of preclimacteric hemorrhage in which biopsy proves the absence of carcinoma are particularly amenable to the action of radium, and because of the necessity of biopsy it should be chosen in preference to x-rays.

Young women should be radiated only under the most exceptional circumstances, for even the lighter doses may prevent pregnancy and, if not, miscarriage is likely to occur. Doctor Siefert's advice on that point is eminently sound.

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DOCTOR SIEFERT (Closing).—Doctor Sargent's views are essentially in accord with my own.

Doctor Ewer, in his discussion, accuses me of condemning diagnostic curettage, and says that I advocate "settling the question of endometrial pathology by guesswork:" If Doctor Ewer will again read my paper and consider it in its entirety, he will see that I advocate not exactly that. I do, however, propose to leave the question of endometrial pathology open in a certain number of cases when the diagnosis of a benign condition can with reasonable certainty be made without resorting to diagnostic curettage. For such cases I advocate treatment with the roentgen ray. Doctor Ewer, in his discussion, does not keep sufficiently in mind the fact that my paper deals with the use of two types of radiation, *i. e.,* roentgen ray and radium, and that the technique of application is, as generally used, fundamentally different with the two agents. Doctor Ewer will notice that wherever radium is to be used in the uterine cavity I advocate doing diagnostic curettage as a matter of course.

Concerning, however, the dangers accompanying diagnostic curettage and the use of radium, let me refer to Ewing, whom I think Doctor Ewer will accept as a competent and unbiased witness. Doctor Ewing says in *Radium Report of the Memorial Hospital,* page 281, 1923, under the heading of "Myoma Uteri": "Yet some observers believe that it is unnecessary to submit all these patients to an elaborate gynecological technique, when they can be cured by external treatment with radium and x-ray." By external treatment with radium Ewing has in mind radium radiation with large quantities of radium of deeply situated organs, percutaneously, entirely analogous to the administration of roentgen radiation. He continues, "All the bad results that I have seen with radiation treatment of myomas have occurred in cases in which the

uterus was dilated, the mucosa curetted off, and radium inserted into the cavity. This familiar process is not without hazards, as it prolongs convalescence and converts the treatment into a substantial gynecological operation which may not always be necessary. Before the days of radium I performed autopsies on the bodies of women who died from latent infection stirred up by simple exploration of the uterus and curettage."

Diagnostic curettage, then, in my opinion, should be a matter of careful consideration and judgment in the individual case and not a routine to be adhered to at all costs. It is for this reason, too, as Doctor Ewer has apparently not noted that I circumscribe the indication of the use of radium in benign conditions rather sharply, in fact, would use it only when immediate cessation of uterine hemorrhage is imperative and in those few cases where only temporary menostasis is desired and there only for the reason that in America direct roentgen dosimetry has not yet been generally adopted (with notable exceptions, of course).

As for carcinoma of the body of the uterus which might be overlooked by omitting a diagnostic curettage, let me say that of all gynecological carcinomata, cancer of the uterine body is only five per cent according to statistics compiled by the large clinics at home and abroad. If such statistics be made to include, in addition to the gynecological carcinomata, also those benign conditions with which my paper deals, the incidence of cancer of the uterine body will sink to about one per cent. If one subtracts from this those cases which may be diagnosed or at least suspected without curettage, it will be seen that the chances of unwittingly radiating a corpus carcinoma under the guise of a benign condition are less than one per cent. Moreover such a mistake in diagnosis may be corrected in reasonable time by watching the patient carefully after radiation, as my paper suggests, and the proper measures then instituted. Adenocarcinoma of the body of the uterus infiltrates late, hence remains operable for a comparatively long time. May I just mention here that the mortality for subtotal hysterectomy is at best one and one-half per cent, a jeopardy into which the patient is asked to place herself when submitting to surgery for a benign condition. A patient dead of embolism following hysterectomy cannot be resurrected, but a patient radiated on a mistaken diagnosis may still be cured of a corpus carcinoma.

As to the frequency of painful menstruation in women at the preclimacteric I will say that is not the question, but rather whether they are suitable for radiation treatment. Those cases, however, in whom menstruation is associated with the unpleasant nervous or other symptoms not referable directly to the genitalia are not very uncommon, I think, Doctor Ewer will concede.

Doctor Ewer makes much of the uncertainties of gynecological diagnosis and utilizes this as an argument for surgery. According to my observation the situation is not so serious and that the percentage of cases which cannot be diagnosed with reasonable accuracy before operation is comparatively small, especially if the proper diligence is used to make a preoperative diagnosis, instead of relying, as is often done, upon the operation to reveal all pathology. I am, moreover, ready and willing to concede to Doctor Ewer that all doubtful cases should be excluded from radiation, and think I have brought out this view sufficiently in my paper.

Concerning the question of lighting up latent infection by radiation, the danger is great only with the intra-uterine use of radium and there, as my reference from Ewing shows, an elaborate gynecological technique without the use of radium may have the same dire results. Still I think the fact is that infection may be diagnosed in the great majority of cases or at least suspected. Acute and subacute cases are excluded from radiation treatment without dispute. Chronic and "burnt out" cases may be treated according to good authority, with small repeated doses of roentgen ray. I am, however, content to leave the question of radiation treatment of these cases in controversy for the present.

As for the statement made in the summary of my paper, item two, which Doctor Ewer states to be "the most controversial of all," I am prepared to concede a point to him. Speaking of roentgen or radium radiation, I state that "It may also be termed the treatment of choice in simple uncomplicated interstitial and intramural fibromyomata of the uterus of all sizes." This statement seemed to me at first sufficiently conservative, after having reviewed in detail the contraindications of radiation therapy. I shall, however, rephrase it to read: "It may be also termed the treatment of choice in simple uncomplicated or intramural fibromyomata of the uterus not exceeding the size of a three months' pregnancy. Larger myomata may be treated with the roentgen ray with excellent hopes of success."

In connection with the uncertainty of diagnosis, of complications and the liability of a shrinking myoma to cause pressure symptoms and to degenerate, I wish to call attention to the statistics gathered by Gauss and his associates of 18,015 cases of hemorrhagic metropathies and fibromyomas, which cover a period of thirteen years—1914-1927. They report a clinical cure in 95 per cent of these cases. Certainly, these German gynecologists must be up against the same difficulties which Doctor Ewer emphasizes so strongly.

My suggestion that American gynecologists are unduly under the spell of surgery, as regards to the treatment of the conditions with which my paper deals, must appeal as correct to anyone who compares the European literature, especially the German, French, and Scandinavian, with the American on the subject.

Now, I think, I have replied to all of Doctor Ewer's major criticisms, and thank him for having forced me to examine carefully the soundness of the points of view presented in my paper. Perhaps with further experience modification will be necessary and my mind shall be open.

PRESENT DURATION OF BREAST FEEDING*

REPORT OF ONE THOUSAND AMERICAN WELL BABIES

By EDWARD J. LAMB, M. D.
Santa Barbara

DISCUSSION *by John Brown Manning, M. D., Santa Barbara; Robert E. Ramsay, M. D., Pasadena; Clifford Sweet, M. D., Oakland.*

FOR many years there has been an interest on the part of pediatricians in the length of time modern mothers nurse their babies. During the past two decades there has been a somewhat general feeling among physicians that mothers were not nursing their babies as long as they could. Ten and twenty years ago papers were published to bring out this point and emphasize the importance of breast feeding. During the last decade extremely few similar papers have been published. Preventive medicine as it relates to infants during this last decade has received much propaganda through the dissemination of literature from such authoritative sources as national, state, county and city health agencies. To the same ex-

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